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ON  
THE CAUSES OF DEATH  
AFTER  
LITHOTOMY.

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BY THOMAS BRYANT.

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A THOUGHTFUL man having failed in any of the ordinary transactions of life, upon which he has bestowed much labour and great attention, quietly sits down, and patiently searches out for the causes of his failure; with the hope, that, on the repetition of his attempt, he may steer clear of the difficulties which previously had interfered with his success. With similar feelings the surgeon carries out this same principle; and with the view of rendering less fatal the operation of lithotomy, I have been induced to search out for the causes of its failure; and thus, having carefully compiled from the records of Guy's Hospital materials upon which some definite conclusions may be drawn, the hope may be expressed that the attempt will not be fruitless, and that some of the causes of death may in future be avoided.

From the *clinical records* of the hospital I have been enabled to collect 176 cases of lithotomy; and from the *notes of the necroscopic examinations*, together with those from the above which terminated in death, 40 fatal cases have been collated. The careful analysis of these materials is given in the following pages, and the first point which asks for our investigation is the influence of age upon the fatality of the operation.

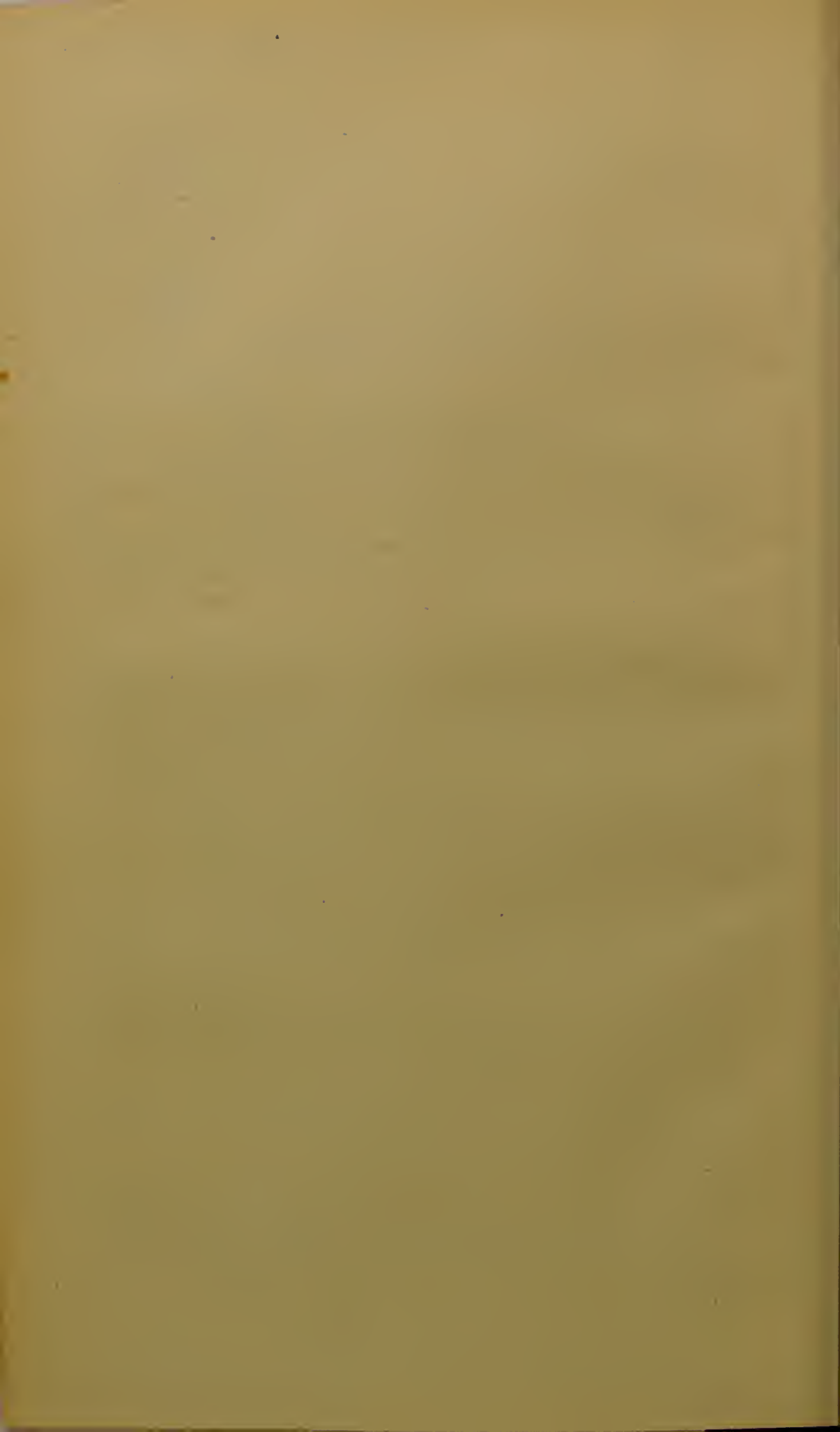


TABLE I.

*Showing the ages at which the operation was performed and its fatality at the different periods.*

				Number of cases.	Per cent.	Cases.	Per cent. fatal.				
5 years of age and under...55				or	31·25, of which	3	or 5·45	} 93 cases, of which 3, or 3·22, were fatal.			
6 years to 10 inclusive ...38				,,	21·59,	,,	— none				
11	,,	20	,,	...36	,,	20·45,	,,	4	,,	11·	} 31 cases, of which 17, or 58·06, were fatal.
21	,,	30	,,	...10	,,	5·68,	,,	—	,,	none	
31	,,	40	,,	... 6	,,	3·40,	,,	—	,,	,,	
41	,,	50	,,	... 7	,,	3·97,	,,	4	,,	57·14	
51	,,	60	,,	...18	,,	10·20,	,,	10	,,	55·55	
61	,,	70	,,	... 5	,,	2·84,	,,	3	,,	60·	} 31 cases, of which 17, or 58·06, were fatal.
71	,,	80	,,	... 1	,,	·56, which was fatal.					
				176		25 cases, or 14·20 per cent., were fatal.					

From the above table it is fair to conclude that lithotomy very early in life, that is, during the first five years, is much more fatal than during the next quinquennial period, the powers of the child being then sufficient to counteract the depressing tendency of an operation, with the accompanying loss of blood and shock to the system. From ten years of age to twenty, lithotomy is more fatal than in the previous decennial period: the bladder with its prostate and neck having then become a more important organ, resents an injury such as an operation, and the system sympathising with its development experiences a like depression; greater fatality would then naturally be expected, and the above table demonstrates the fact. As time progresses, and man in his maturity is enabled to resist disease, and the effects of injury or surgical operations, lithotomy diminishes in its frequency, and also in its fatal tendency. But as age creeps on, and the powers of life begin to fail, the operation for stone becomes more serious, and its fatality much greater, 58·06 per cent. of the cases operated upon proving fatal.

TABLE II.

*Analysis of 40 fatal cases.*

				Number of cases.		
5 years of age and under. ....				4	or	10 per cent.
6 years, and under 10 inclusive ...				2	„	5 „
11	„	20	„	6	„	15 „
21	„	30	„	2	„	5 „
31	„	40	„	2	„	5 „
41	„	50	„	7	„	17.5 „
51	„	60	„	11	„	27.5 „
61	„	70	„	4	„	10 „
71	„	80	„	1	„	2.5 „

} 57.5 per cent.

The age of one adult is not mentioned.

The conclusions which may fairly be drawn from the above table, well confirm those deduced from the consideration of the former one.

It will be seen that 10 per cent. of the whole number of fatal cases occurred during the first five years of life, and that during the second the fatality was diminished exactly one half.

During the next decennial period, when the genito-urinary organs become by their rapid development an important system, the fatality is much larger, as shown by the 15 per cent.

During manhood, when the powers of life are at their height, although lithotomy then becomes a somewhat rare operation, the fatality again falls, and but 5 per cent. represents the fatal number.

As age progresses, and the powers of resistance against surgical interference become less, the fatality proportionately increases, and more than half the fatal cases are above forty-one years of age.

*Conclusions.*

1. That lithotomy is at least twice as fatal during the first five years of life, as it is during the second.

2. That during puberty, or between 11 and 20 years of age, it is more fatal than during any earlier period.

3. That after 20 and up to 40 years of age it is comparatively of small fatality.

4. That 30 per cent. of the fatal cases are during the first twenty years of life.

5. That 10 per cent. are during the second twenty years of life.

6. That 60 per cent. are above 40 years of age.

7. That 14.20 per cent. of the cases operated upon prove fatal.

#### UPON THE CAUSES OF DEATH.

##### *I. Hæmorrhage as a cause of death.*

Under this head must be enumerated six of the forty fatal cases, or 15 per cent.

CASE I.—A child, æt.  $4\frac{1}{2}$ , sixteen hours after the operation had hæmorrhage, followed by death upon the fourth day.

CASE II.—A man, æt. 20, died upon the twenty-sixth day after repeated bleeding.

CASE III.—A man, æt. 38, after the removal of a large stone, sank upon the third day.

CASE IV.—A man, æt. 49, having had continual oozing of blood for two hours after the operation, gradually sank upon the fourth day.

CASE V.—A man, æt. 52, six days after the operation had secondary hæmorrhage, this continued at intervals till the twelfth, and upon the seventeenth he sank exhausted.

CASE VI.—A man, æt. 56, on the fifth day had bleeding, and sank upon the eighth.

In three of the above cases chloroform was administered, and in three not. In four other fatal cases hæmorrhage followed the operation; two dying from urinary infiltration, one from pyæmia, and one from acute suppurative inflammation of the kidney. In the two former chloroform was not employed, in the two latter it was.



*II. Cases in which the patient never rallied after operation.*

Under this head are five cases, or 12·5 per cent.

CASE VII.—One, a man, æt. 70, who had had symptoms of stone for nearly three years, his bladder was very irritable, and would not contain more than a few ounces of water. Two calculi were removed by lithotomy under the influence of chloroform; the wound sloughed after the operation, and the patient never rallied, dying upon the fifth day.

On examination after death, the lungs were found œdematous, and heart having undergone the senile fibrous change of structure. The kidneys were pale and soft, and, microscopically, the tubules were found filled with granules and fatty matter; their pelves were healthy, as also were the ureters. The bladder was small, its muscular coat was somewhat hypertrophied and sacculated, the mucous membrane was entire and comparatively healthy. The prostate was slightly enlarged. The perineal wound was sloughing. The peritoneum and other viscera were healthy.

CASE VIII.—A man, æt. 48, after experiencing symptoms for eighteen years, was lithotomized at his own urgent request. He was an extremely unfavorable subject for operation. His urine was offensive and purulent, and for some time previously charged with solid phosphates. After the operation, he appeared for several days to be doing well, being much relieved from his severe pain; and although no marked symptoms appeared, he sank upon the fourth day. The necropsy revealed a healthy peritoneum; pale and mottled liver; kidneys large but healthy; ureters normal, and bladder but little hypertrophied, its mucous membrane was of a dark olive colour, and was thickened and abraded upon the summits of all the rugæ. There were two or three small sacci present, and the bladder contained some dark mucus. The prostate was healthy and cleanly cut. Chest and other viscera were quite healthy.

CASE IX.—The third case was in a man, æt. 44, from whom a stone was removed which had formed round a portion of

broken bougie left in the bladder. He sank rapidly after its removal. After death the kidneys were found mottled and large. Bladder of moderate size, with some old spots of ulceration upon its mucous walls nearly cicatrized. Prostate was large and cleanly cut, there was no sign of reparation in the wound; the abdominal and thoracic viscera were quite healthy, and no other signs of disease visible.

CASE X was in an old man, *æt.* 72, from whom a large stone was removed through a deep perinæum; after forty-eight hours he died exhausted. The post-mortem examination revealed flabby and coarse kidneys, ureters dilated to about twice their natural size. Bladder dilated, and its mucous membrane reddened in patches from recent inflammation, and in points ulcerated, evidently of old standing, from the thickened edges. Between the openings of the ureters into the bladder a pouch existed behind the prostate, capable of holding a large chestnut. The third lobe of the prostate was somewhat enlarged, and two sections of the gland had been made in the operation. No infiltration of urine was present.

CASE XI was in a man, *æt.* 42, who sank twenty-four hours after the operation; there was no hæmorrhage or visible cause of death, and no post-mortem to enable us to discover one.

In the first case only was chloroform administered.

### III. *Pyelitis, Inflammation of the Kidneys, as causes of death.*

Under this head are included six cases, or 15 per cent.

CASE XII.—A man, *æt.* 65, after the operation of lithotomy, gradually sank, and died upon the eleventh day. The chest and peritoneum were found healthy. Kidneys contracted from old disease, speckled, white, granular, and firm, and their structure sprinkled with purulent deposit. The ureters were large, and bladder thickened; its muscular coat was hypertrophied, and mucous lining coarse, and in parts abraded and sloughing. External to the muscular coat, and beneath the peritoneum, was an abscess the size of a chestnut, which

contained pus and a slough. Incision was limited, and its surface covered with dirty fibrin. The liver was coarse, and its tunic thickened. The spleen was soft, small, and pale.

CASE XIII.—A man, *æt.* 58, died upon the sixth day after lithotomy. Both kidneys were found inflamed, the left the most so, and in one patch almost gangrenous. Bladder thickened, and its mucous membrane covered with adherent lymph, in the lines of the rugæ particularly, and about some small pouches near the prostate. The thoracic and abdominal viscera were healthy.

CASE XIV.—An adult, after lithotomy, dying, his kidneys were found to contain many cysts, and their cortical structure granular and contracted; their pelves were ecchymosed, dilated, and contained purulent mucus. The ureters also were dilated and diseased. The bladder was thickened and contracted, its mucous membrane sacculated, and in one a calculus had been imbedded. The stone, however, at the time of the examination was found in the cavity of the bladder. The mucous membrane was granular and disorganized. Prostate gland enlarged, and the line of incision through it was very free. The external wound was in a sloughing state. Peritoneum contained some serum, and was intensely injected. Thoracic and abdominal viscera were healthy.

CASE XV.—A boy, *æt.* 14, after lithotomy, died about the fourteenth day. The right kidney was found to contain large cysts in its cortical structure and pelvis, all communicating to form one large cyst, surrounded externally by a thin layer of cortical structure. The tunic separated with difficulty. The ureter was three times its natural size, adherent to the surrounding cellular tissue, and irregularly twisted in consequence of external adhesions. The left kidney was also dilated, with its pelvis and ureter; the sac contained purulent serum, and on its inner surface were points of injection with lymph. The bladder was contracted and thickened, its mucous membrane irregular and sacculated; it contained puriform mucus, highly ammoniacal. The incision into the bladder had apparently closed, but externally the wound was granulating and would soon have healed. The peritoneum was slightly injected,



and some slight effusion of lymph existed. The other viscera were healthy.

CASE XVI.—A man, æt. 56, having been cut, the operation being followed by free hæmorrhage, died upon the following day. After death, acute suppurative inflammation of the kidneys to a most extensive degree was found to have existed; the organs were large and swollen, and infiltrated with purulent deposits throughout their cortex; their pelves and ureters were dilated, and mucous membrane inflamed. The bladder was comparatively healthy, two small ulcers existing at the neck. The viscera generally were fatty.

CASE XVII.—A man, æt. 43, having convalesced after the removal of a calculus from the prostatic portion of the urethra, upon the thirty-fifth day was seized with diarrhœa, his urine became purulent, and symptoms of irritative fever made their appearance; these symptoms continued, and upon the forty-sixth day he died. After death the kidneys were found pale, their pelves dilated, and in one the pelvis and calyces were almost sloughing. At the right side of the bladder there was a pouch, which contained a calculus the size of a pigeon's egg; the mucous membrane was gray, sloughing, and irregularly calcareous. The calculus was covered with layers of phosphates; the membranous portion of the urethra was opaque, the mucous membrane thickened, and immediately behind it was the line of incision, smooth, and firmly united, except anteriorly, where it presented an opening which admitted a probe, and communicated with a sinus which passed to the perinæum.

#### IV. *Pelvic Cellulitis as a cause of death.*

Of all the dangers which follow the operation of lithotomy, pelvic cellulitis may be mentioned as the one which, by itself and in combination with other morbid complications, generally proves the most fatal. In its advance it is somewhat insidious, and often is only positively made known when some peritoneal complications make their appearance. Its cause has generally been assigned to a too extensive incision of the neck of the bladder; but the careful consideration of the cases

which I have now collected would not appear to confirm this general opinion, but to suggest that pelvic cellulitis, although a fatal complication, is one that for the most part arises without urinary infiltration, as a result of continuity of a structure which has become inflamed from the necessary injury inflicted upon it by the operation, or by the presence of a calculus.

In the following cases such an opinion seems to be supported, as also in others associated with other complications.

Under this head of pelvic cellulitis as a cause of death are numbered six cases, or 15 per cent.

CASE XVIII.—A healthy child, æt. 6, having had an oxalate of lime calculus removed by lithotomy, without the slightest difficulty, appeared to progress favorably till the noon of the following day, when pain and tenderness of the hypogastric region made their appearance. On the second day symptoms of severe prostration came on, which proved fatal at night, or forty-eight hours after the operation.

*Post-mortem.*—In the pelvis the peritoneum was somewhat injected, and in parts glued feebly together, more especially at its sides. The cellular tissue subjacent to the peritoneum in the anterior part of the pubic region was infiltrated with sanguinolent, but not puriform fluid; and posteriorly, inferiorly, and laterally was softened and easily broke down, and was in parts infiltrated with sanious, sero-purulent fluid; this infiltration of cellular tissue extended upwards towards the kidneys. Mucous membrane of bladder slightly red, but appeared otherwise healthy. Kidneys and other viscera were healthy. The incision through the prostate was limited.

CASE XIX.—A boy, æt. 15, gradually sank after lithotomy.

The bladder appeared bruised on its inner surface, and its coats thickened. The pelvis contained much pus, which had passed through an opening in the peritoneum which communicated with an abscess between the fundus of the bladder and the peritoneum. The intestines at this part were adherent to each other. Viscera and other parts were healthy.

CASE XX.—A boy, æt. 14, having had symptoms of stone

for ten years, was cut, when on the fifth day symptoms of peritonitis appeared, which proved fatal in twenty-four hours. No post-mortem examination was made.

CASE XXI.—A fat man, æt. 50, was lithotomized, and the stone removed with some difficulty, as it continued to clude the forceps. The patient never rallied, and died thirty-two hours after the operation.

The pelvic peritoneum was found after death to be minutely injected, and in the pelvis was some slightly puriform effusion. The cellular tissue beneath and round the bladder was extremely lacerable. The prostate was cleanly cut. The mucous membrane of bladder was ecchymosed, but otherwise healthy. Kidneys slightly mottled; other viscera healthy.

CASE XXII.—A man, æt. 51, after lithotomy, had some oozing of blood; did well till the fifth day, when marked symptoms of pelvic cellulitis appeared, and he died upon the sixth. No post-mortem examination was made.

CASE XXIII.—A man, æt. 54, after being cut, had slight hæmorrhage. Upon the second day erysipelas of parts appeared, upon the sixth rigors, followed by death upon the eighth, with symptoms of pelvic cellulitis. No post-mortem permitted.

#### V. *Pyelitis and Pelvic Cellulitis as a cause of death.*

The combination of pyelitis and pelvic cellulitis is not an uncommon one, as out of the forty fatal cases there are six instances, or 15 per cent.

CASE XXIV.—A boy, æt. 14, having had symptoms of calculus from infancy, was lithotomized, although his urine was purulent; some blood was lost at the operation, and on the second day some pain and tenderness of the abdomen, with general symptoms of peritonitis, made their appearance. He improved by treatment for a few days, but his powers began to fail, and upon the tenth day he died.

After death, the peritoneum was found granular and greasy,



from recent inflammation, particularly its pelvic portion. Kidneys were reduced to a mere shell, the cavity being filled with purulent fluid; in the little cortical structure that remained recent pus was visible. Ureters as large as small intestines, thickened and inflamed. Bladder contracted, walls hypertrophied, and its mucous membrane uneven and rugose. The tissue round the bladder was in a state of suppuration, behind and between the bladder and the rectum, passing upwards into the sheath of the rectus abdominis muscle. The wound at the neck of bladder was at its usual place, and not too extensive. The other viscera were healthy.

CASE XXV.—A man, æt. 34, having had symptoms for years, was cut, and a large oxalate of lime calculus, covered with phosphate, removed; great depression followed the operation, and on the following day acute pain in the hypogastric region made its appearance; this rapidly spread, and on the second day he died. The right kidney presented a mere capsule containing pus; the left enlarged, but healthy. The ureters were normal. Bladder thickened, and its mucous membrane at the neck ecchymosed. The cellular tissue round the bladder was filled with pus. Other viscera were healthy.

CASE XXVI.—A man, æt. 25, having experienced most severe symptoms for eighteen years, and obstinately refused to submit to an operation, at last, from the intensity of his suffering, sought it in despair. The operation was attended with much difficulty, one of the calculi having been nearly the size of a small egg, but being lamellar it broke into several portions. The second stone was a smaller one, the sides of which had little or no appearance of having been worn.

The patient survived only three days, having gradually sunk.

The abdomen only was examined after death. There was considerable peritoneal inflammation, particularly at the lower part of the abdomen, which was bathed with a brownish puriform fluid. The kidneys were nearly all absorbed; they contained large cysts filled with sero-purulent fluid; the ureters were as large as one's fingers, and very tortuous. The bladder was nearly half an inch in thickness, its mucous membrane



thickened and granular, of a livid and dusky-red colour, with a considerable quantity of adherent eoagulable lymph. About the middle of the bladder, and at its side, was a small opening through the museular coat, which nearly led to the cellular tissue around; it was irregular, with a purulent surface. It had no appearance of having been incised, but it is not improbable that a small pouch had existed, and that the irritation inseparable from the repeated introduction of the instrument had contributed to effect the opening. The cellular tissue in the pelvis was soft and lacerable, and sprinkled with numerous points in which suppuration was commencing. The other viscera were healthy.

CASE XXVII.—A man, æt. 68, who had been the subject of stricture for twenty years, and for the last five months had suffered much from severe bladder-symptoms, after dilatation of the stricture, was lithotomized, and an oxalate of lime calculus coated with phosphates removed. Some slight oozing of blood followed the operation; but the man never rallied, and sank upon the third day.

On neeroseopie examination, the kidneys were found to be degenerated, and the pelvis of the left inflamed. Bladder was thicker than natural; its mucous membrane was of a dark colour and in places sloughing, and adherent to it were patches of phosphates. The cellular tissue round the bladder and rectum and sides of pelvis, nearly as high as the psoas muscle, was inflamed and suppurating in small points of pus. Wound at neck of bladder was almost sloughing. The urethra showed the appearance of a cured stricture in its spongy portion. The mucous membrane was rough and inelastic at the spot, and covered with old adventitious deposit. The other viscera were healthy, except some senile changes.

CASE XXVIII.—A man, æt. 59, after symptoms for six years, was operated upon with difficulty as the stone was impacted; much blood was lost at the time; and, fifteen hours after, he died rather unexpectedly. After death the heart was found enlarged, and its muscular tissue encroached upon externally by fat; the coronary arteries were much diseased, and atheroma upon the valves. The kidneys were much diseased, from

chronic inflammation; the eortex was soft, red, and contracted, and full of purulent deposits. The pelves contained pus, which distended them. Ureters were dilated, and mucous membrane inflamed. Bladder was contracted, and externally looked healthy; its interior presented two portions, having very different aspects; close to the neck was a pouch where the calculus had been impacted, and above this the more healthy-looking bladder which had held the urine. This was somewhat thickened, and its mucous membrane inflamed. The lower portion which surrounded the sac was raised, soft, and vascular when in contact with the stone, and the coats beneath were soft. Round the bladder, in the cellular tissue, was some brown, watery, purulent fluid, the result of inflammation. The prostate was somewhat enlarged and freely divided.

In the above case it is clear that as the patient had only survived the operation fifteen hours, the pelvic cellulitis must have been the result of the presence of the stone, and not the consequence of any operative interference—well bearing out the opinion expressed in a former page.

CASE XXIX.—A man, æt. 22, after lithotomy, died; although the period and symptoms are not mentioned.

The peritoneum was found acutely inflamed. The left kidney was small, and its glandular substance was nearly absorbed; its pelvis was enlarged, and contained a calculus the size of a swan-shot. The right was larger than natural, soft, pale, and flabby; but contained no trace of distension or obstruction. Left ureter large and thin; but nowhere evincing any recent obstruction. Bladder but little thickened, mucous membrane but little altered. Prostate cleanly cut, and but very moderately. The cellular tissue at base of bladder infiltrated with pus. Wound sloughing. Other viscera healthy.

#### VI. *Pelvic Cellulitis associated with accidental causes.*

The three following cases afford good instances of the accidents with which the operation of lithotomy may be attended. The first is a case where the rectum was punctured;

the second of perforation of the posterior wall of the bladder; and the third of sloughing of the rectum, &c., after the removal of a large calculus.

CASE XXX.—A boy, æt. 9, was operated upon, the double-edged gorget being used. Some difficulty was experienced in extracting the stone, on account of its large size. On the following day he complained of great pain in the lower part of the abdomen and in the wound, fæces passing by the latter. On the second his excitement became worse, attended with delirium, and towards evening he died.

After death acute suppurative inflammation in the cellular tissue surrounding the bladder was detected, extending for a considerable way between the body of the bladder and the peritoneal covering. The rectum was perforated just above the sphincter for about an inch. The prostate gland was not entirely divided, a small portion remaining whole on each side of the urethra. The bladder was much thickened; but its mucous lining appeared healthy. The peritoneum and other viscera were healthy.

CASE XXXI.—A boy, æt. 5, after lithotomy, attended with hæmorrhage, died, twenty hours after the operation.

Miliary tubercles were found in liver and bowels. The bladder was surrounded with red serum, its posterior wall was deeply injected, and covered with a film of lymph. Upon opening the bladder, the incision through the prostate was found to be very limited; but near the trigone a puncture was seen half an inch in its posterior wall, full of dissolving blood. The kidneys and other viscera were healthy.

CASE XXXII.—A man, æt. 65, having had symptoms of stone for six years, was operated upon and a large calculus removed. Upon the fifth day he died.

The thoracic viscera were healthy. The peritoneum was covered in patches with flakes of lymph. The liver was mottled and congested. Spleen natural. Kidneys large and labby, with cysts. The external wound was sloughing, and the finger could be passed from the rectum into the opening made for the extraction of the stone. The incision through



the prostate was free, and extended to the neck of the bladder. The mucous membrane of the bladder was ecchymosed in a few spots. In the anterior wall of the rectum an elliptical opening existed, one inch and a half long. Diffuse suppurative inflammation extended in the cellular tissue between bladder and rectum, and in the recto-vesical pouch; at one point the peritoneum was in a sloughing condition, but no perforation had taken place. Suppuration had also extended behind the peritoneum, as high as the kidneys on the left side and to the crest of the ileum upon the right.

### VII. *Pyæmia as a cause of death.*

Five cases of the forty died with symptoms of pyæmia, or 12·5 per cent.

CASE XXXIII.—A man, æt. 19, who had experienced symptoms of stone from infancy, was operated upon, and a small oxalate of lime calculus removed; the operation was followed by considerable hæmorrhage, arrested by the plug. On the fourth day it returned, and again upon the eighth day; upon the fifteenth rigors and symptoms of pyæmia made their appearance, followed by death upon the twenty-sixth day.

On examination after death, the lungs were found to contain lobules of consolidated tissue, and some pleurisy. Liver pale. Peritoneum and intestines healthy. Kidneys were large; pelves ecchymosed and dilated. Ureters also were dilated. Bladder thick; mucous membrane natural, and slightly ecchymosed near neck and orifice. Upon the left side of the bladder, in the cellular tissue, a small deposit of healthy pus was found; a second existed under the subpubic ligament. Between the glutei muscles a large abscess existed; but not communicating with the pelvis. Pus existed in the cells and veins of the corpora cavernosa. The left branch of the dorsal vein of the penis, in its passage to unite with the prostatic veins, had been obstructed and prevented the passage of the blood; one inch further another closure was discovered, and between those points the vein was full of a yellow thick fluid like pus.



The perineal wound had almost healed, admitting only a probe.

CASE XXXIV.—A man, æt. 54, with an impaired constitution, and irritable bladder after lithotomy, died upon the fifth day, without any marked symptom.

The necroscopical examination revealed lungs filled with lobules of inflamed tissue, easily lacerable, and becoming purulent. The right kidney was large, and subject of acute suppurative inflammation, involving all its structures, and its pelvis acutely inflamed; the right ureter also was inflamed and dilated. The *left* kidney was quite healthy, except two small white specks upon its surface; as also was the left ureter. The bladder was firmly contracted; the mucous membrane covered with a small quantity of purulent mucus, but otherwise healthy. The whole extent of the wound was in a sloughing condition, and the cellular tissue round the bladder in a similar condition. No suppuration had occurred. The incision was limited, through a prostate somewhat enlarged and indurated. Peritoneum and other viscera were healthy.

CASE XXXV.—A man, æt. 57, after lithotomy was convalescing, when he was seized with rigors and pyæmic symptoms upon the seventeenth day, and died upon the twentieth.

CASE XXXVI.—A man, æt. 58, with severe symptoms, old bronchitis, and great constitutional depression, after eight years' suffering, was operated upon, and a large calculus, weighing two ounces, removed. He gradually sank upon the thirteenth day. After death, pleurisy and pyæmic lobular pneumonia were detected. Kidneys wasted and contracted, with much deposit of pus in their cortical structure. Pelves and ureters were also slightly inflamed. Bladder was thickened and contracted; its mucous membrane sloughing, and covered with phosphates; the cellular tissue round was infiltrated with pus. The wound was sloughing.

CASE XXXVII.—A man, æt. 44, after lithotomy, by which an oxalate of lime calculus was removed, progressed favorably till the twelfth day, when diarrhœa and symptoms of pyæmia

appeared, from which he rapidly sank. No post-mortem was made.

### VIII. *Acute Cystitis as a cause of death.*

This was illustrated in the case (No. xxxviii) of a man, æt. 57, who for twelve years had been suffering from symptoms of calculus in his bladder. He was operated upon, and a large stone, composed of the oxalate of lime, covered with phosphatic deposit, removed. In forty-eight hours he died, with symptoms of acute cystitis.

Two cases remain to be related—one of the child which died with acute inflammation of the air-passages after the administration of chloroform, and the second where peritonitis seemed to be the cause of death.

CASE xxxix.—A healthy child, æt. 2, was seized two hours after the operation of lithotomy, performed under the influence of chloroform, upon a cold February day, in a cold operating theatre, with quickness of respiration, attended with some difficulty. These symptoms rapidly became worse, and, six hours afterwards, it was evident that acute bronchitis was present. The disease progressed rapidly, and proved fatal forty-eight hours after the operation. After death, the larynx, trachea, and bronchi were found to have been acutely inflamed; their mucous membrane was of a bright red colour, soft, swollen, and slightly granular upon its surface. The whole of the glottis and under surface of the epiglottis participating in the inflammation. The tubes were filled with greenish, tenacious mucus, through both lungs. The lungs, heart, and abdominal viscera were healthy. In the pelvis some slight subperitoneal ecchymosis was visible. The kidneys and bladder were healthy, and the incision into latter limited.

CASE xl.—A child, æt.  $2\frac{1}{2}$ , although fat, had several indications of ill health; his stools were unnatural—sometimes green, and sometimes clay-coloured. Tongue furred, and he was fretful, and appeared to be suffering from abdominal pain. As these symptoms were thought to have been kept up by the

presence of a calculus, he was operated upon. The child appeared to be doing well for twenty-four hours, when he suddenly became ill, and died upon the third day.

After death, the peritoneum, especially at the lower part of the abdomen, was minutely injected, some lymph glueing the lower convolutions together. The mesenteric glands were enlarged, and the Peyer's patches in the intestines. The kidneys were mottled, and of a pale colour; the right ureter was dilated. Bladder was healthy. The incision through prostate was regular and somewhat free, apparently incising the neck of the bladder. There was a good deal of coagulated blood behind the peritoneum, in pelvis, at the left of the bladder, and on the iliac fossa.

TABLE III.

*Influence of Chloroform upon the fatality of Lithotomy.*

Cases in which Chloroform was given.							Cases in which it was <i>not</i> given.												
Periods.	Ages.			Number.	Cured.	Fatal.	Per centage.	Number.	Cured.	Fatal.	Per centage.								
1.	5 years of age and under...			24	...	22	...	2	or	8·33	31	...	30	...	1	or	3·33		
2.	6 years and 10 inclusive...			17	...	17	...	—	„	—	21	...	21	...	—	„	—		
3.	11	„	15	„	...	13	...	12	...	1	„	7·69	11	...	10	...	1	„	9·09
4.	16	„	20	„	...	4	...	2	...	2	„	50·	8	...	8	...	—	„	—
5.	21	„	30	„	...	2	...	2	...	—	„	—	8	...	8	...	—	„	—
6.	31	„	40	„	...	1	...	1	...	—	„	—	5	...	5	...	—	„	—
7.	41	„	50	„	...	4	...	2	...	2	„	50·	3	...	1	...	2	„	66·66
8.	51	„	60	„	...	8	...	3	...	5	„	62·5	10	...	5	...	5	„	50·
9.	61	„	70	„	...	3	...	1	...	2	„	66·66	2	...	1	...	1	„	50·
10.	71	„	80	„	...	—	...	—	...	—	„	—	1	...	—	...	1	„	100·
					—	76	—	62	—	14	—	18·42	—	—	89	—	11	—	11·

Of the two fatal cases which occurred during the first five years of life, in which chloroform was given, one died from hæmorrhage, which came on sixteen hours after the operation, and proved fatal upon the fourth day. The second was a boy, æt. 2, who was seized, two hours after the operation, with acute inflammation of the air-passages, which destroyed him upon the second day. The operation was performed in a cold theatre, upon a February winter's day. The case in which chloroform was *not* given died from urinary infiltration and peritonitis, the result of perforation of the posterior wall of the bladder, in twenty hours; the operation, however, having been followed by free hæmorrhage.



The fatal case which took place between the ages of 11 and 15, in which chloroform was used, was caused by chronic pyelitis and absorption of the kidney, with pelvic cellulitis. The case which occurred at the same period in which chloroform was *not* employed, proved fatal upon the sixth day, with symptoms of peritonitis.

The period in which the fatality was comparatively the greatest, the comparison turning against the administration of chloroform, is the fourth; when it will be seen that 2 cases out of 4 proved fatal when the anæsthetic was administered, and not one of 8 in which it was not given. The cause of death in one case was pelvic cellulitis; in the second pyæmia; the operation in both instances having been followed by free hæmorrhage. In the periods which follow the advantage which one table gives over the other is of no marked character, the increase of one period in one table being counterbalanced by a corresponding increase in the other in the succeeding period. And taken as a whole, the balance is about equal.

Of the 9 fatal cases which are numbered in which chloroform was employed, one man, æt. 49, sank upon the fourth day from loss of blood; and of the remaining 8, in all the kidneys were found much diseased, either with acute suppurative inflammation of their structure, or some chronic change.

Of the 8 cases where *no* anæsthetic was administered, one man, æt. 42, sank in twenty-four hours after the operation, the existence of hæmorrhage not being mentioned; one, æt. 72, died forty hours after the operation, in which a very large stone was removed; one man, æt. 52, died upon the eighteenth day, secondary hæmorrhage having taken place upon the sixth day; one man, æt. 44, died from diarrhœa and phlebitis, the day not being mentioned; two, æt. 54 and 65 respectively, upon the eighth and fifth days, with pelvic cellulitis; one, æt. 51, with pelvic cellulitis, which took place upon the fifth and proved fatal upon the sixth day, considerable oozing of blood having followed the operation; and one, æt. 57, who upon the sixteenth day had nearly convalesced, when rigors and symptoms of phlebitis set in, proving fatal upon the eighteenth.

Taken as a whole, of the 14 fatal cases where an anæsthetic was administered, 2 died from hæmorrhage, or 14·27 per cent.;



1 from inflammation of the air-passages ; 1 from pyæmia after hæmorrhage ; 1 from pelvic cellulitis after hæmorrhage ; and 9 from acute or chronic disease of the kidneys, with pelvic cellulitis.

Of the 10 cases where *no* anæsthetic was employed, 1 died from hæmorrhage, or 10 per cent. ; 1 sank twenty-four hours after the operation, probably from hæmorrhage, although the fact was not stated. One old man sank. Three died from pelvic cellulitis, in 1 of which much blood followed the operation ; 1 with symptoms of peritonitis, probably associated with pelvic cellulitis ; and 2 from pyæmia.

The conclusions which may be drawn from the above are somewhat negative. Taking the deaths from hæmorrhage only, the difference is against the administration of chloroform 4·27 per cent. But taking hæmorrhage as a symptom, and either producing death or occurring so copiously as to reduce the patient, and thus allow secondary causes to act more prejudicially upon him, the balance in favour of the administration of chloroform is 1·43 per cent.

The only case (No. xxix) which, perhaps, tells decidedly against its use is the child, æt. 2, who died upon the second day after its administration. But here the fact of the operation having been performed upon a cold winter's day, in a cold theatre, must be taken into account, and perhaps taken alone we should not be justified in deciding that chloroform was the only cause.

TABLE IV.

*Analysis of the 40 fatal cases as regards the cause of death and influence of Chloroform.*

6 cases died from hæmorrhage	.	.	in 3 chloroform was given, in 3 not.
5 „ sank after the operation	.	.	in 1 „ in 4 „
6 „ died with pycclitis, &c.	.	.	in 5 „ in 1 „
6 „ „ pelvic cellulitis	.	.	in 0 „ in 6 „
6 „ „ the two former complications	.	.	in 3 „ in 3 „
3 „ „ pelvic cellulitis, from accidental causes	.	.	in 0 „ in 3 „
5 „ died from pyæmia	.	.	in 1 „ in 4 „
1 „ „ cystitis	.	.	in 1 „ in 0 „
1 „ „ bronchitis	.	.	in 1 „ in 0 „
1 „ „ peritonitis	.	.	in 0 „ in 1 „

The above analysis yields a somewhat similar conclusion as regards the influence of chloroform upon the fatality of lithotomy, as the previous table; as regards hæmorrhage as a cause it is equal in both; and in cases where sinking after the operation was the cause of death, the table shows in favour of the administration of chloroform.

In the next line there is an argument against its use, as the cases of pyelitis are much more numerous when it was employed; but with respect to pyæmia its administration is again supported.

The fatal bronchitic attack might be cited as a marked instance against it, but upon the whole the argument against is very weak.

### *Conclusions.*

1. That lithotomy is at least twice as fatal during the first five years of life as it is during the second.

2. That during puberty, or between 11 and 20 years of age (the third period), it is more fatal than during any earlier period.

3. That after 20 and up to 40 years of age, it is comparatively of small fatality.

4. That 30 per cent. of the fatal cases are during the first 20 years of life.

5. That 10 per cent. are during the second 20 years of life.

6. That 60 per cent. are above 40 years of age.

7. That 14·20 per cent. of the cases operated upon prove fatal.

8. That hæmorrhage is the cause of death in the proportion of 15 per cent.

9. That 12·5 per cent. of the fatal cases die from exhaustion, or simple sinking; and that these are generally above the middle period of life.

10. That pyelitis or inflammation of the kidney is the cause of death in 15 per cent.

11. That pelvic cellulitis is the cause of death in 15 per cent.

12. That this pelvic cellulitis is not generally the result of a too extensive incision through the prostate, but is the result of

continuity of a structure which has become inflamed from the necessary injury inflicted upon it by the operation, or by the presence of a calculus.

13. That the combined influence of pyelitis and pelvic cellulitis prove fatal in 15 per cent.

14. That 12·5 per cent. die from pyæmia.

15. That pelvic cellulitis, the result of accidental causes during the operation, may prove fatal in 7·5 per cent.

16. That disease of the kidney is found in at least 30 per cent. of the fatal cases.

17. That pelvic cellulitis is found in at least 37 per cent. of the fatal cases, either alone or associated with other disease.

18. That peritonitis, as the result of lithotomy and cause of death, is never found unassociated with other complications, such as pelvic cellulitis or perforation of the bladder.

19. That acute cystitis may alone prove the cause of death.

20. That chloroform, independent of its own special risks, does not seem to have any influence upon the fatality of lithotomy.

